III Encontro de Ferrovias ANTF
27 e 28 | Outubro | 2011
Universidade Federal de Juiz de Fora
Juiz de Fora | MG

O futuro está nos trilhos e o Brasil vai bem de Trem

BUILDING HEAVY HAUL RAILWAYS

Technology and Economics

Dr. David Rhodes
Technical Director
Pandrol Ltd.

GROUPE DELACHAUX

IAT

PANDROL
TRACK SYSTEMS

Technology and Economics

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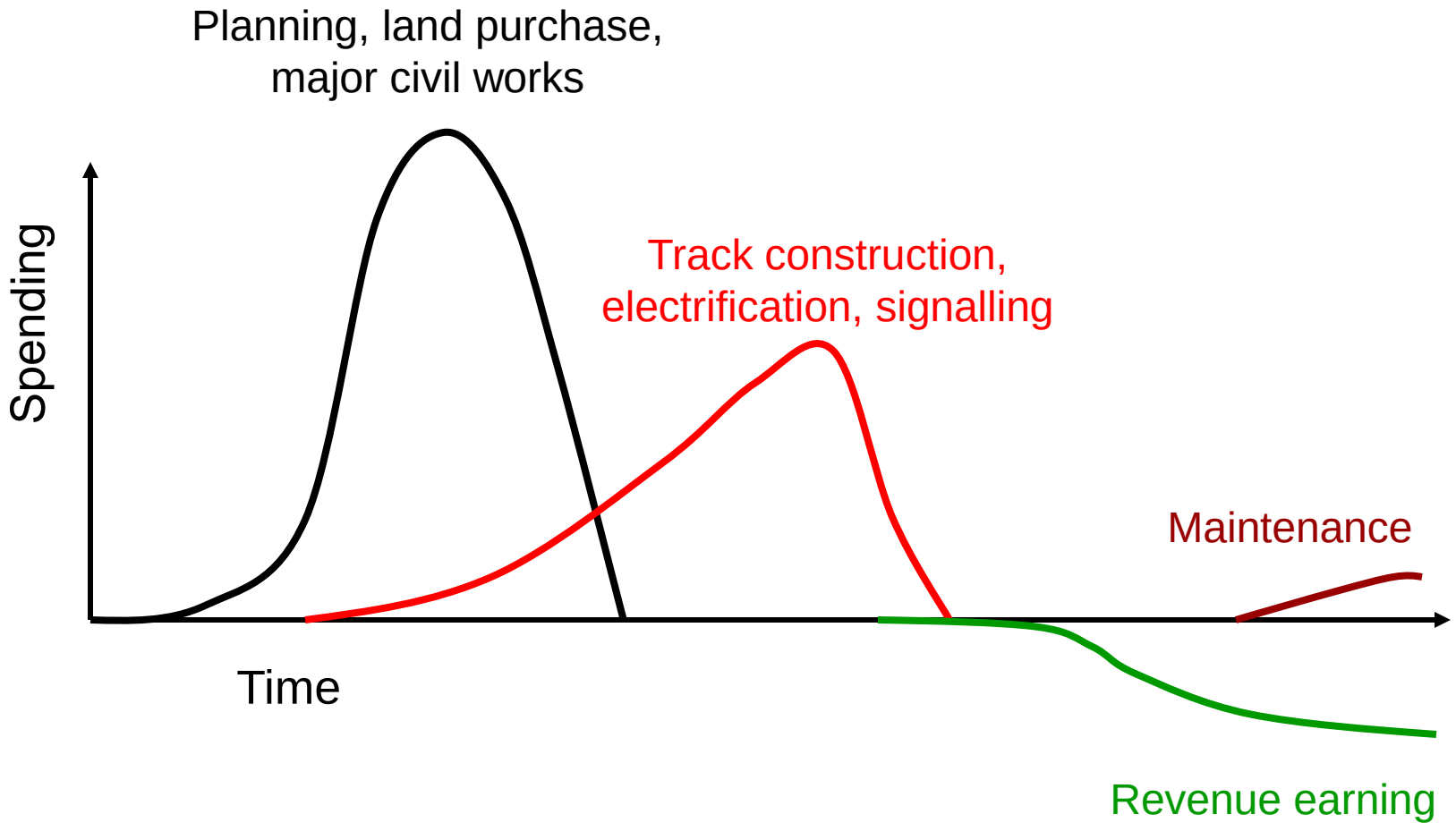

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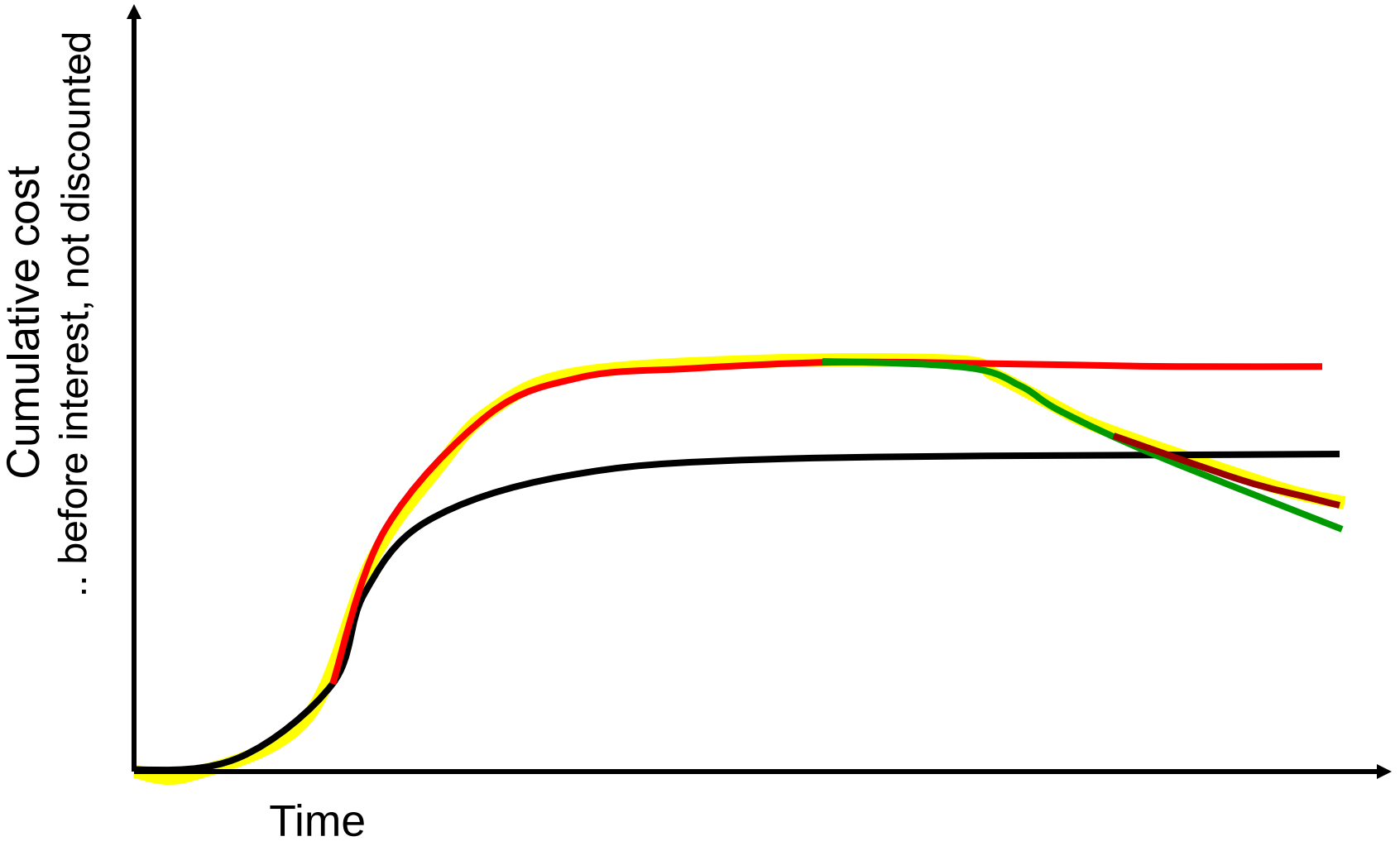

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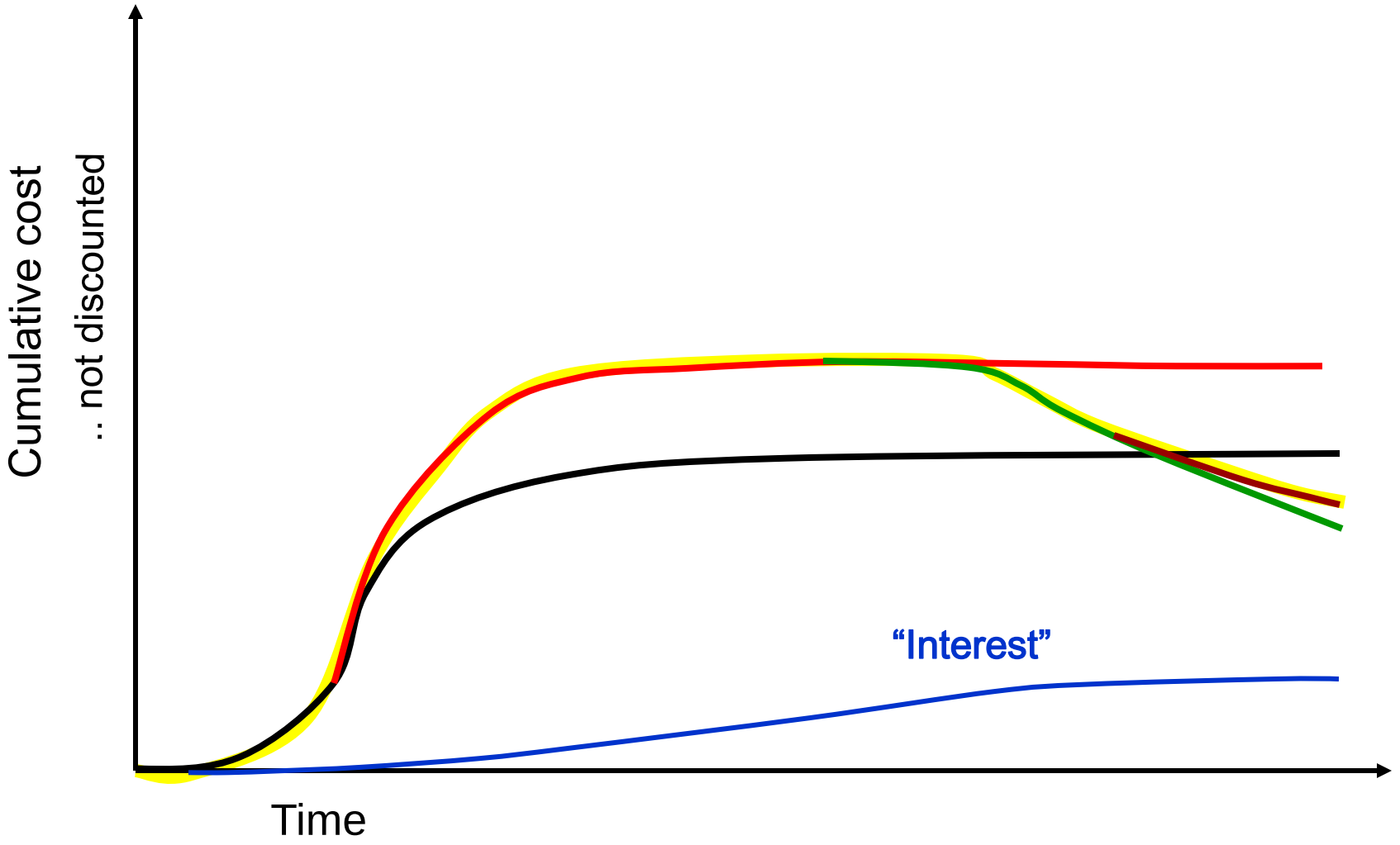

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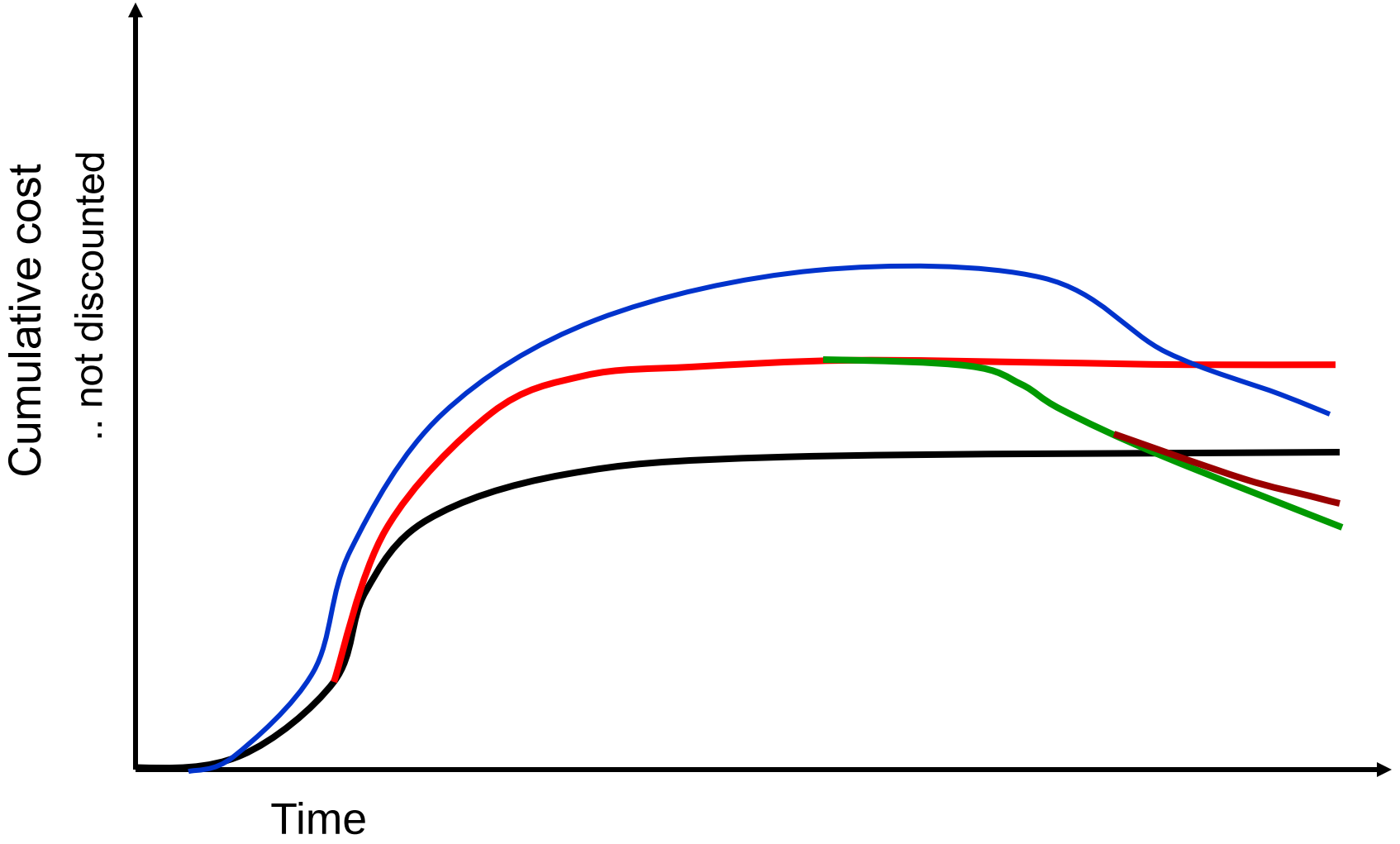

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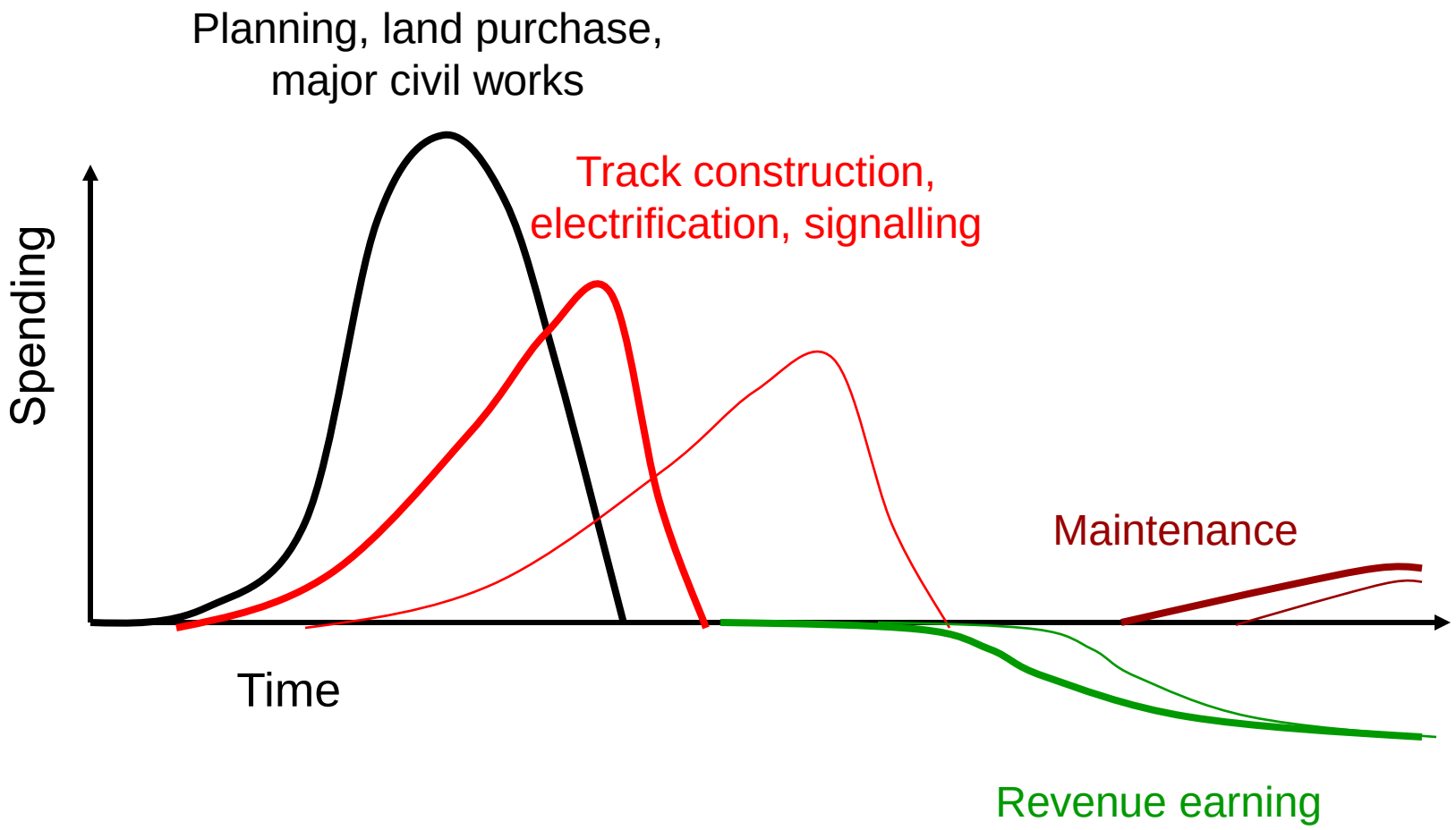


If the net present cost of a sub-system is calculated in isolation, there is a benefit in delaying expenditure.

However, if that sub-system lies on the Critical Path, any delay in expenditure causes a delay in the start of the income stream.

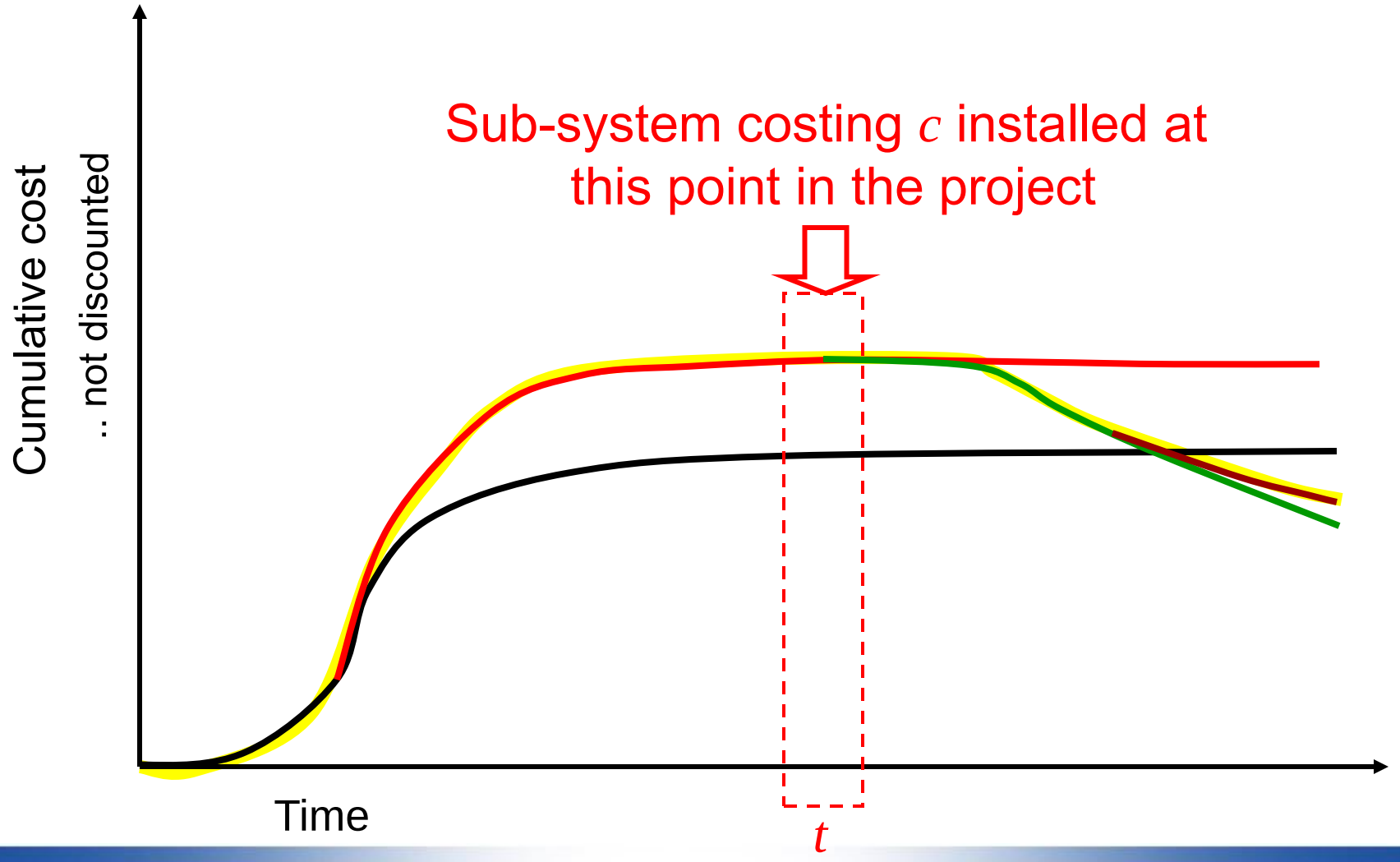
Therefore delay of critical sub-systems increases interest costs.

Life cycle cost calculation for each sub-system must take into account the interest associated with delay to the total system.

The net present cost of a sub-system should be calculated taking into account the "value of time" i.e. the extra interest costs that would be incurred if the whole project were delayed by late delivery of this sub-system.

That way, delay of critical sub-systems is seen as an increase in the net present cost of the sub-system.

Life cycle calculation for each sub-system does take into account the interest associated with delay to the total system.



Conventionally …

Net present value of sub-system cost, $NPV_c = c / (1 + i)^t$

However, ***if*** the sub-system installation is on the Critical Path, and the installation delays the project completion by a time, d, then the extra interest cost is $d \times C_t i$, where C_t is the ***total*** spend on all of the project up to the time, t.

We can think of $C_t i$ as the "Value of Time".

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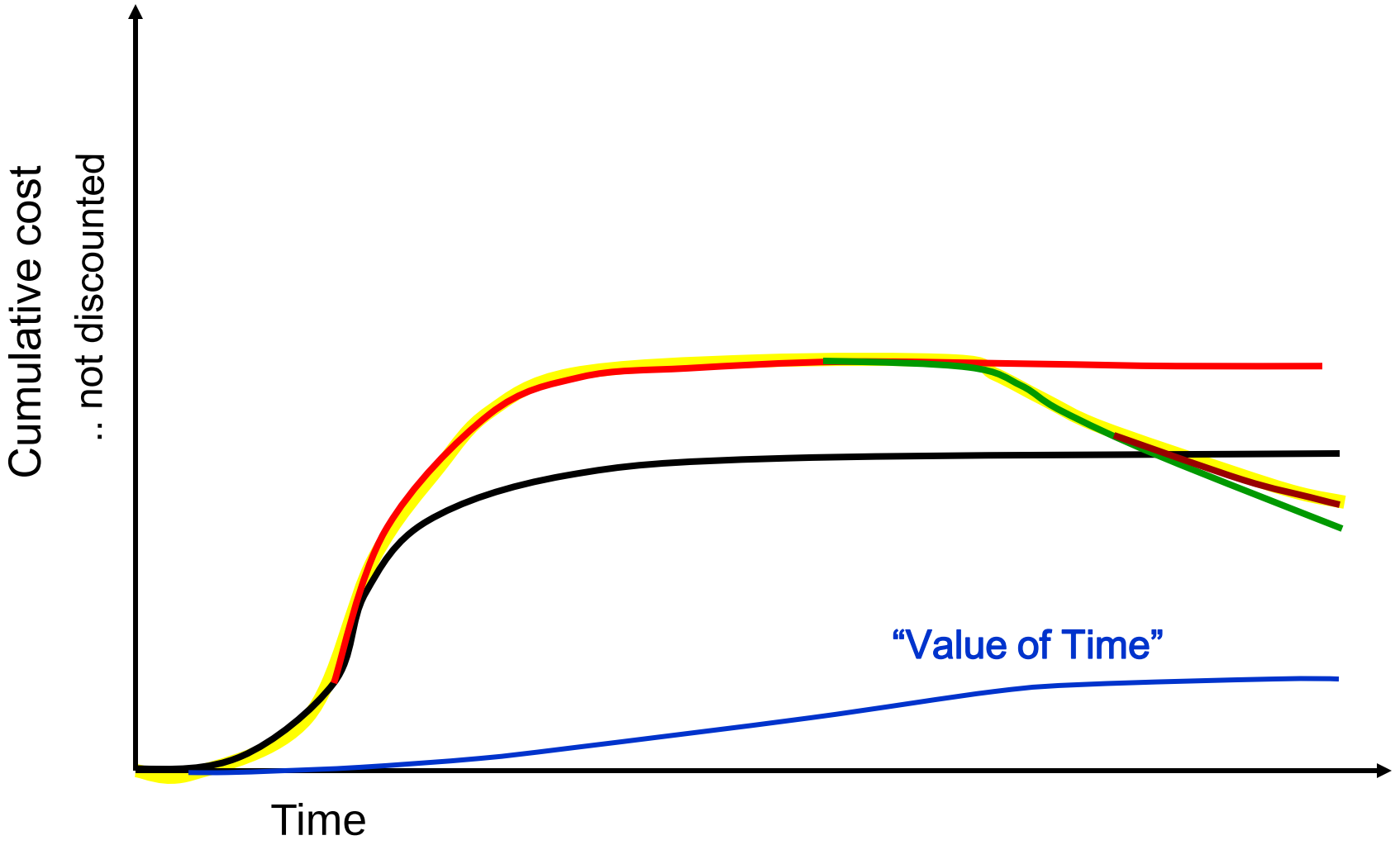

We now have …

$$NPV_c = (c + d.C_t i) / (1 + i)^t$$

Note that C_t could be several orders of magnitude bigger than c.

Even if the delay is short (i.e. d is small)
and interest rates are low (i.e. i is small)
the value of $d.C_t i$ can be bigger than the value of c.

What technology is available to reduce timescales, or to run tasks in parallel or to reduce the risk of delays?

Later in the presentation I will talk about ….

… pre-assembly of track components.
(to take activities off the Critical Path).

… automation of track construction.
(to speed up activities on the Critical Path).

What technology is available to reduce operating costs?
.. or to increase revenues?

(For examp creased axle loading?

CONFLICTING REQUIREMENTS?

What logy is available to reduce technical risks?

(F nple) stick to well proven technology: Only buy things which comply with international standards.

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What technology is available to reduce operating costs?
.. or to increase revenues?

(For example) increased axle loading?

What technology is available to reduce technical risks?

Learn from the leaders! Understand the technology and develop future technical standards.

KEY POINTS:

If we only use simple economic / financial models we run the risk of rejecting new technology that might save us money!

If we only use established, “standard” technology we run the risk of missing opportunities to earn more money!

Economists and technologists need to understand each other to maximise the opportunities!

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Enough of the philosophy – what about the practical details?